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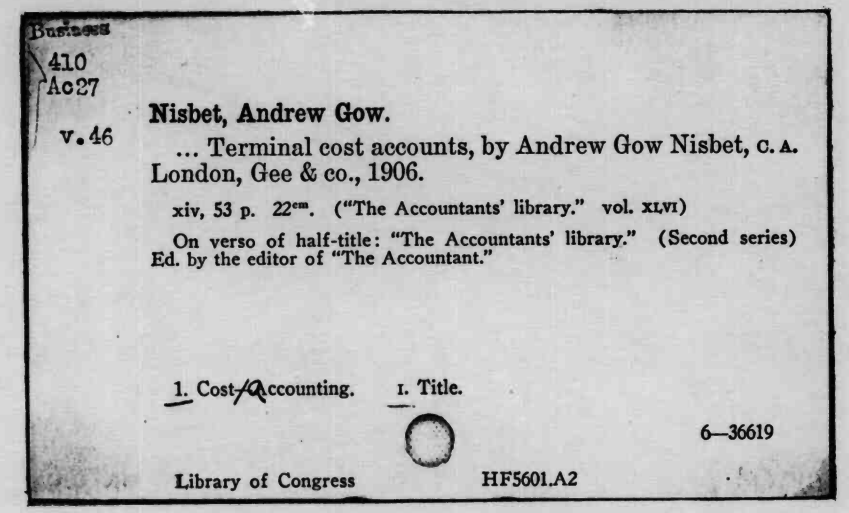

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Nisbet, Andrew Gow.
... Terminal cost accounts, by Andrew Gow Nisbet, C. A. London, Gee & co., 1906.
xiv, 53 p. 22cm. ("The Accountants' library." vol. XLVI)
On verso of half-title: "The Accountants' library." (Second series) Ed. by the editor of "The Accountant."

1. Cost accounting. I. Title.

6—36619

Library of Congress HF5601.A2

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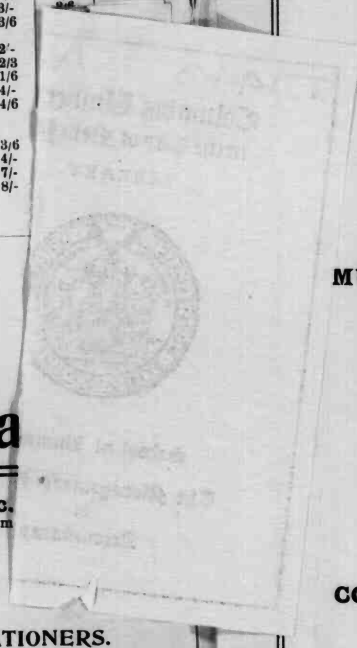

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TERMINAL COST ACCOUNTS

BY

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EDITOR'S PREFACE.

THE object of the series of handbooks that is being published under heading of THE ACCOUNTANTS' LIBRARY is to provide, at a reasonable price, detailed information as to the most approved methods of keeping accounts in relation to all the leading classes of industry whose books call for more or less specialised treatment. No such series has hitherto been attempted; but there exist, of course, numerous separate works dealing with the accounts of one particular class of undertaking. These separate works are, however, for the most part either too expensive, or too superficial to answer the purpose that is particularly aimed at by THE ACCOUNTANTS' LIBRARY, which is intended to supply the student with that specialised information which he may require, while at the same time affording to the trader, banker, or manufacturer who is not in a position to secure the fullest information for his purpose, knowledge which can hardly fail to be of the very greatest assistance to him in the correct keeping of his accounts, upon a system specially adapted to his requirements, and therefore involving a minimum expenditure of labour. It is expected that the series will also be found of material assistance to bookkeepers of all classes.

Without aiming at giving an exhaustive account of the manner in which each separate business is conducted, the technical points in connection with each industry will receive as much attention as is necessary in order fully to elucidate the system of accounts advocated, while each volume will be the work of one who has made that particular class of accounts more or less a speciality. It is obvious, however, that to enable the necessary ground to be covered in the space available, it is incumbent to assume upon the part of the reader a certain knowledge of general bookkeeping. The extent of the knowledge assumed will vary according to the nature of the class of accounts considered. For example, in the volumes on "Bank Accounts" and "Shipping Accounts," a thorough acquaintance with ordinary double-entry bookkeeping is not unnaturally assumed; but in the case, for instance, of "Auctioneers' Accounts," "Domestic Tradesmen's Accounts," and other similar volumes, such explanations are included as will enable the ordinarily intelligent reader fully to grasp the methods described, even although his knowledge of bookkeeping may be of an elementary description. These explanations are, doubtless, superfluous as far as accountants are concerned, but are necessary to make the volumes of value to the majority of those specially engaged in these particular industries.

To subscribers for the whole series it may be added that, when completed, it will form a most valuable and practically complete library, dealing, at the hands of specialists, with practically every class of accounts, and illustrating the application

of the theory of double-entry as described in general works on bookkeeping.

The first series (of twenty volumes) has already been completed, and particulars of the subjects dealt with will be found on p. i. A second series (which will comprise about thirty more volumes) is now in progress, which when issued will complete the scheme. Many of these have already been arranged for, but the Editor will be glad to receive suggestions and offers from accountants of experience for the undertaking of volumes not yet announced.

34 Moorgate Street,
London, E.C.
June 1903.

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EDITOR'S INTRODUCTORY NOTE.

THE organisation of a system of Cost Accounts in any established business depends mainly for its success on the relation of its methods to the lines on which the business has been developed.

A survey of the problems met with in various classes of business shows that lines of organisation, rather than similarity of products, provide the clearest basis for a system of Cost Accounts.

It follows, therefore, that we may classify all industries, or undertakings, in groups, according to their lines of organisation. By this means we are able to treat separately with the special problems and requirements of each group, and to indicate the methods which are specially applicable to any particular organisation of business.

The grouping adopted in this series will be as follows:—

Multiple Costs.—Applicable to undertakings where a number of products are involved bearing little or no apparent relation to each other in cost or selling price—such as Engineering Specialties, Cycles, Hosiery, Boots, Furniture, Agricultural Implements — in which standardisation in parts is carried to a high degree of specialisation in manufacturing.

Terminal Costs.—Applicable to undertakings where definite contracts are entered into, in which the costing is definite and terminating—such as Engineers, Shipbuilders, Builders, and the like.

Single Costs.—Applicable to Breweries, Collieries, Quarries, Mines, and businesses in which there is a natural unit of cost, as the barrel, the ton raised, &c. &c.

Process Costs.—Applicable to Chemical Industries, Food Products, &c., in which conversion of material takes place, and there are principal and by-products, such as Tanners, Fellmongers.

Operating Costs.—As Railways, Tramways, Gas and Water Undertakings, Electricity, and similar industries.

It is to be noted, however, that there are instances of business which, from the special nature of their organisation, except themselves from their own group. The character of their production, and the degree of specialisation attained in the method of manufacture, constitute the only effective basis of decision as to which group they should be classified under.

The present volume deals with the second of these groups, and the other volumes dealing with Single and Process Costs are in preparation. The volume on Multiple Costs has already been issued.

INTRODUCTION.

A GREAT deal of attention has recently been drawn to the subject of Cost Accounts, and many views expressed in the various articles which have lately appeared in the different magazines and journals connected with the accountancy and engineering professions.

Cost Accounts are, however, by no means of recent introduction, as in many manufacturing concerns they are indispensable, and without them the manufacturer would be unable to ascertain whether he was working at a profit or loss. This applies more particularly when the work undertaken is by contract.

From a perusal of the many publications and articles on Cost Accounts which have recently appeared, it is apparent that the time has now arrived for specialisation of the subject.

Many of the recent articles that have been written, when regarded from a practical point of view, are too elaborate, simplicity and adaptability being the most important considerations to be taken into account when inaugurating a system of Cost Accounts.

There has been so much American literature on the subject of Cost Accounts lately that many undertakings desirous of modernising their Accountants' Department are carried away

with the idea that costing originated in America, and that to be up to date they must run their counting-house on American lines, and immediately proceed to introduce some "foreign" system. This in many cases proves not only costly, but inexplicable to the staff, who are lost among the plethora of entries and transfers from Book to Card and Card to Ledger.

From practical experience the opinion has been formed that no system of costing can be adopted universally, different undertakings requiring different systems; and this opinion is generally shared by those who have had practical experience in Cost Accounts.

In this book the subject dealt with is Terminal Costs, and the system described has been found to work satisfactorily, at the same time with a minimum of clerical expense.

It may be mentioned that no attempt is made to deal with organisation or administration, although the book is written from experience gained in actual practice, and may be regarded in the light of a text-book.

The weights, moneys, and quantities used for the purpose of illustration do not represent actual weights or values of the articles mentioned, being for illustration purposes only.

TERMINAL COSTS.

CHAPTER I.

PROCEDURE ON RECEIPT OF ORDERS.—CHARGING UP OF MATERIAL DIRECT, MATERIAL FROM STORES, AND CARRIAGE ACCOUNTS.

THE method of obtaining orders by firms engaged in any of the above branches of engineering is generally by contract. As, for example, a Constructional Engineer may contract to erect a building or bridge of steel structure, or contract to deliver a specified number or quantity of articles—such as steel or iron tanks, pipes, troughs, girders, &c.—for a specified sum of money. Usually such a contract is obtained by open competition in a keen market, tenders being invited from the various firms engaged in that particular class of work.

Forms of tender may usually be had on application to the party inviting the tender, at whose office it is also customary to provide a set of drawings for inspection. Forms of tender are generally supplied in duplicate, one copy to be sent in, the other to be retained by the person sending in the tender. As a rule, the tender usually sets off with an agreement clause, followed by the conditions of the contract and specification of the requirements.

Let us assume, then, that we are invited to tender for the delivery and erection of a bridge of steel structure. On obtaining the necessary Form of Tender the first steps to be taken —after an inspection of the drawings—will be the preparation of a detailed estimate and specification showing calculated weights

and quantities, the material being priced out at estimated cost. The following is an example of a specification showing the material required for a bridge for the Bengal Railway Company:—

Fig. 1.—

SPECIFICATION OF MATERIAL REQUIRED FOR BRIDGE No. 42, FOR BENGAL RAILWAY CO.

		Calculated Weight			Rate					
		Tons.	cwts.	qrs.	£	s	d	£	s	d
STEEL PLATES.—										
300 Steel Plates	6′ 6″ × 3′ 3″ × ⅜″	50	0	0	6	0	0	300	0	0
50 "	7′ 9″ × 3′ 9″ × ⅜″	8	0	0	5	15	0	46	0	0
150 "	7′ 0″ × 3′ 3″ × ½″	30	0	0	6	0	0	180	0	0
80 "	6′ 9″ × 2′ 6″ × ½″	10	0	0	6	0	0	60	0	0
250 "	7′ 0″ × 2′ 6″ × ⅝″	50	6	0	5	10	0	275	0	0
150 "	7′ 0″ × 2′ 6″ × ½″	40	0	0	6	0	0	240	0	0
480 "	6′ 6″ × 2′ 6″ × ¾″	60	0	0	5	10	0	330	0	0
500 "	8′ 9″ × 4′ 6″ × ⅝″	100	0	0	6	0	0	600	0	0
460 "	8′ 9″ × 3′ 9″ × ¼″	80	0	0	6	0	0	480	0	0
TEES AND ANGLES.—										
Steel Angles	" × "	20	0	0	5	10	0	110	0	0
"	" × "	10	0	0	5	10	0	55	0	0
"	" × "	8	0	0	5	10	0	44	0	0
"	" × "	5	0	0	5	10	0	27	10	0
Steel Tees	" × "	20	0	0	6	0	0	120	0	0
"	" × "	10	0	0	6	0	0	60	0	0
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		486	0	0						
RIVETS.—										
	7″ × ¾″	10	0	0	8	0	0	80	0	0
	5″ × 1″	3	0	0	8	0	0	24	0	0
	6″ × ¾″	5	0	0	8	0	0	40	0	0
	6″ × ⅝″	2	0	0	8	0	0	16	0	0
		20	0	0						
BOLTS AND NUTS.—										
Hex. rd. hex.	5″ × 1¼″	5	0	0	12	0	0	60	0	0
	6″ × 1¼″	4	0	0	12	0	0	48	0	0
	5″ × ¾″	3	0	0	12	0	0	36	0	0
	6″ × ¾″	5	0	0	12	0	0	60	0	0
		17	0	0						
FELT—1,200 ft.			..		0	2	0	120	0	0
PAINT			..			..		26	0	0
TUBING for Handrail—300 ft.			..		0	0	3	3	15	0
								£3,471	5	0

The detailed Estimate being drawn up in the following manner:—

BRIDGE No. 42 FOR BENGAL RAILWAY.—520 TONS.

	£	s	d
Material required as per Specification	3,471	5	0
*Labour, as per Schedule, 520 tons at £2 5s. ..	1,170	0	0
Carriage and Freight, 520 tons at £1	520	0	0
Erection, £2 per ton	1,040	0	0
Use of Erectors' Tools and Tackle	155	0	0
Travelling Expenses	300	0	0
	6,656	5	0
Shop Expenses, 50% on Labour .. .. .. (*Note.*—This percentage is based on result of last year's figures, and not estimated on what the current year's expenses will amount to.)	585	0	0
Establishment Charges, 20% on Labour .. (*Note.*—Do. do.)	234	0	0
	7,475	5	0
10% Profit	747	0	0
	£8,222	5	0

Marginal Note.—See Chap. III. for full explanation regarding the adoption of this method for reserving for Shop Expenses and Establishment Charges.

* Estimated Amount of the different classes of Labour in manufacture:—

	Per ton		
Template Making	£0	1	0
Shearing and Punching	0	8	6
Drilling	0	4	0
Rivetting	0	2	6
Smithwork	0	4	0
Sundries	0	3	0
Planing	0	5	0
Plating	0	15	0
Straightening and Cold Saws ..	0	2	0
	£2	5	0

Having therefore prepared our detailed estimate and specification, we are now in a position to fill in the Form of Tender. Very frequently estimates have to be prepared at very short notice. The records of previous work, however, are of great value to the staff, and there is little likelihood of any serious error arising, even should the estimate be got out hurriedly.

Quotations for any special material, or special work, can usually be had in the shortest of time.

It will be noticed that in drawing up the estimate Shop Expenses and Establishment Charges have been provided for by a percentage on labour basis. A special chapter on the method of treating these important items will be found in the book, and the reasons shown for the adoption of this method.

On receipt of information that our tender has been accepted, and instructions to proceed with the work, the initial step will be the recording of the order in the Orders Received Book, at the same time assigning to it a number, which is known as the Works or Shop Order Number, and by which it will be recognised throughout its construction in the shop. Order numbers are also issued for any work put in hand in connection with the firm's own buildings or machinery and plant—viz., all "work done for selves"—standing orders being issued for work in connection with repairs and renewals in the shop, but special order numbers are assigned to all orders of the nature of capital expenditure.

Particulars of each contract are then entered in the Drawing Office Specification Book, and on completion and approval of the necessary drawings orders are at once put in hand for delivery of the material required. The specification of material required is a very important document, forming the foundation, as it were, of the job, showing not only the material required, but also the quantity, dimensions, and calculated weights, which, when the job is finished, are very useful as a check on the actual weights. The calculated weight and actual weight in undertakings of this nature as a rule come out very close. This specification should form the basis on which all material required for the job is ordered.

As is well known, the steel and iron markets fluctuate considerably from time to time, and it is customary for engineering concerns in this line to enter into contracts—when favourable opportunities present themselves—with the various rolling mills for the delivery of so many tons of material to be delivered from time to time as required. The chief material is therefore never kept in stock to any extent, but immediately a contract is secured an order is issued to the rolling mills for the delivery of the various sections of material required, as shown in the specification.

On delivery the material is carefully checked with the specification, to see that it agrees with same, and marked with the number of the order for which it is to be used, if not already marked before leaving the rolling mills.

On receipt of the invoices for steel and iron they are checked with the specification and counterfoils in the Goods Ordered Book, and the shop order number for which the material has been ordered is marked against each item in the invoice. The invoices are then handed to the Accountants' Department to be dealt with in the following manner:—

The calculations are first checked and the invoices charged up in the Cost Ledger to the accounts opened for each order, the amounts being entered in the Steel and Iron column, at the same time entering the weight of the material as shown on the invoice, and marking on the invoice the various folios of the Cost Ledger where the amounts have been charged. It will thus be seen that the posting is done direct from the invoice. A facsimile of the ruling of the Cost Ledger is shown by Fig. 3.

Fig. 3.—

COST LEDGER.

Contract No..... Description..... Date when Commenced..... Date when Finished .....

Date	Description of Material	Weight	Steel and Iron	Other Material Direct	Material from Stores	Rivets	Paint	Expenses Chargeable (Travelling, &c.)	Labour	Shop Expenses	Erectors' Wages	Use of Erectors' Tools	Carriage and Freight	Total Cost	Description of Material Invoiced	Date of Invoice	Weight as Invoiced	Rate per Ton	Sales Value as Invoiced
		T. c. q. lb.	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d			T. c. q.	£ s d	£ s d

After charging up the invoices in the Cost Ledger they are then numbered and entered in the analytical Purchase Journal, carrying out the total amount to the Steel and Iron column. The monthly total of this Steel and Iron column is agreed with the steel and iron charged up in the Cost Ledger for the corresponding month before posting the monthly total of the Purchase Journal to the Private or Nominal Ledger—*i.e.*, all steel charged for the month as per the Cost Ledger should balance with the amount of steel purchased as per the Purchase Journal.

A facsimile of the ruling of the Purchase Journal is shown by Fig. 4.

All other material required for the contracts other than steel and iron—viz., special material which is not kept in stock, but which may be required for the particular job on hand—is ordered against the particular contract, and the invoice earmarked in the same manner as the steel and iron invoices, and treated in a like manner in the Accountants' Department, where it is entered in the Cost Ledger to the order number to which it is chargeable, the amount being placed in the "Other material direct" column. The invoice is then numbered and entered in the Purchase Journal, the total amount being carried out to the "Other material direct" column, this column being balanced monthly with the corresponding column in the Cost Ledger in the same manner as the Steel and Iron.

PURCHASE JOURNAL.

Date	No. of Invoice	Name	Description of Goods	Details	Ledger Folio	Total	Steel and Iron	Other Materials direct	Stores Stock	Carriage Chargeable	Carriage Unchargeable	Coal and Coke		Office Expenses	Yard Expenses	Repairs and Renewals	Sundries	Capital Expenditure: Directors' Tools and Tackle	Capital Expenditure: Additions to Yard and Slidings and Buildings	Capital Expenditure: Additions to Machinery and Plant
				£ s d		£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	T. c. q.	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d

Fig. 4.—

When invoices of material for stores are received by the Accountants' Department they are dissected under various heads in a Stores Analysis Book. For form see Fig. 5.

STORES ANALYSIS BOOK.

£ s d	£ s d	£ s d	£ s d	£ s d

Fig. 5.—

The various heads under which the stores are classified are, viz.:—

Steel and Iron for Stock.
Rivets.
Bolts and Nuts.
Paint and Oils.
Lubricating Oils.
Hydraulic Leathers, Belting, and Belt Fasteners.
Oil for Fuel.
Timber.
Nails, Twine, and Emery Cloth.
Files.
Duplicate Machine Parts.
Sundries (divided under various heads as required).

The weight, or quantity and price, is also entered in the Stores Analysis Book, and the name of the firm from whom purchased. This is a most important book as regards the Cost Accounts, and forms the cost clerk's reference when pricing material issued from stores. The invoices are then numbered and entered in the Purchase Journal, and the amounts carried out into the column headed Stores Stock. Great care should be exercised in analysing the invoices into the Stores Analysis Book, as the totals should, of course, agree with the Stores Stock column in the Purchase Journal.

Material issued from stores, whether for a specific job or for any repairs in the shop, is only issued by the storekeeper to the workmen on presentation of a Stores Ticket, duly signed by one of the foremen, and bearing the shop order number of the job for which the material is required. For form of Stores Ticket see Fig. 6.

Fig. 6.—

STORES TICKET.

PLEASE DELIVER MATERIAL AS BELOW.

Required for Order No..... .....190...

No. of Articles	DESCRIPTION	Tons cwt. qr. lb.	Rate	£ s d

Issued by.....
Received by..... .....*Foreman.*

The storekeeper files these Stores Tickets as they are executed, and enters the particulars of the material issued in the Stores Day Book—viz., description, number or weight, and where possible the firm from whom they were purchased, as in many cases this greatly assists the Accountants' Department in what is one of the most vital points in Cost Accounts, the actual pricing of material from stores. The Stores Day Book is analysed weekly by the storekeeper under the various order numbers, and the analysis passed on to the Accountants' Department, where it is priced out and charged up in the Cost Ledger to the various order numbers under the heading of Material from Stores. In the case of rivets a special column is used, so as to show them separately from other stores material, for various purposes, not the least of which is in connection with the balancing of the Stores Account at the end of the year.

In some concerns such items as Rivets and Paint are not recorded when issued from stores, but a fixed rate charged, according to the weight of the material used on the contract, at so much per ton; although in such instances the rate fixed may be found at the end of the year to work out pretty accurately, there is no reason why rivets should not be weighed out and charged in the same manner as other material. In some undertakings the actual quantity of rivets required for each job is calculated by the Drawing Office, and where this is done it enables the Accountants' Department to check the actual quantity used.

Few large engineering firms actually keep a record of the paint issued from stores, and the amount of paint chargeable to each particular job is based on estimates, either according to the weight of the job, or, where possible, on superficial area. The person responsible for the estimate has, as a rule, had long experience of this special class of engineering work, and it will be found at the end of the year when balancing—if a separate balance is got out of the Paint Account—to come out very accurately.

All accounts for railway carriage are dealt with in the same manner as other invoices, the items being taken *seriatim*, and each item earmarked with the shop order number to which it refers. The items which cannot be charged to a specified job, such as sundry small charges, are marked unchargeable. The Carriage Account is then summarised as between "chargeable" and "unchargeable," the chargeable items being charged up from the Carriage Account to the respective order numbers in the Cost Ledger. The invoice is then entered in the Purchase Journal, distinguishing between chargeable and unchargeable carriage, the totals being posted to separate accounts.

CHAPTER II.

METHOD OF CHARGING UP LABOUR.—ERECTORS' WAGES.—ALLOCATION OF AMOUNT CHARGEABLE FOR USE OF ERECTORS' TOOLS.—SALES.

The next item forming chief part of the cost is Labour, or, in other words, Wages, and the next point to consider is the allocation to some order number of all wages paid. As was seen in the last chapter, all material was either ordered for some specific job or ordered for stores, and, when issued from stores, charged to some particular job. In a like manner every workman's time must be charged up to an order number, whether he is engaged on productive or unproductive work; and in order that this can be carried into effect each workman must return to the timekeeper either a Daily Time Card or Weekly Time Book, showing the number of hours he has worked each day, the nature of the work on which he was engaged, and the shop order number, or numbers, opposite the corresponding amount of time spent on the different orders.

As a contract will often take as long as twelve months to complete, and even longer, the charging up of the workmen's time weekly is thought to be quite close enough for cost purposes. Two small Time Books are therefore allotted to each workman, for alternate weeks, bearing the registered number of the workman on the cover. Each workman records daily in his Time Book the number of hours

worked, description of the work engaged upon, and the shop order number on which he is engaged. (See Fig. 7 for form of Workmen's Time Book.) Each week the workmen's books are

Fig. 7.—

Description of Work	Order No.	Thurs.	Fri.	Sat.	Mon.	Tues.	Wed.	Total Hours

collected by the timekeeper, who passes them on to the Accountants' Department, where each workman's book is dealt with, the number of hours worked being charged up in the "Shop Time Book" (see Fig. 8 for form of Shop Time Book) to the various shop order numbers, together with the name of the workman, the time being extended at whatever rate of wages the workman is paid, and the amount carried out under whichever heading it represents—viz., Smith work, Rivetting, Planing, Drilling, Punching, Plating, &c. In the event of the workman being paid piecework, or on the premium system, the amount representing piecework wages, or balance (if on the premium system), is, of course, entered. Each week, after all the workmen's time has been charged up in the Shop Time Books, the

Fig. 8.— Order No..... Description.....

Date	Workman's Name	Rate	Templates		Smithwork		Sundries		Rivetting		Planing		Platers		Shearing and Punching		Drilling		Cold Saws and Straightening		Total
			Hrs.	£ s d	Hrs.	£ s d	Hrs.	£ s d	Hrs.	£ s d	Hrs.	£ s d	Hrs	£ s d	Hrs.	£ s d	Hrs.	£ s d	Hrs.	£ s d	£ s d

cost clerk extracts from the Shop Time Books a schedule showing all the shop order numbers worked upon during the week, whether on productive or non-productive work, and against each order number the total amount of wages charged for the week. The total of this schedule should, of course, balance with the total amount of wages paid as per the Wages Book for the corresponding week.

The totals on this schedule are then entered in the Cost Ledger to the respective order numbers, the amounts being placed in the Labour column. It is advisable to keep a separate Shop Time Book for charging up all workmen's time on order numbers representing either capital expenditure or upkeep, also a separate Cost Ledger for this purpose, which should be subdivided as between capital and maintenance; thus keeping all work done for selves separate from customers' orders, and showing every week at a glance how much expenditure has been incurred in the way of additions to machinery and plant and upkeep of same.

As regards Draughtsmen's Time, some firms record this in the same manner as the workmen's time, each draughtsman recording his time in a similar manner to the workman. As, however, there must necessarily be a lot of time spent on estimates and drawings in connection with tenders which prove unsuccessful, and in the long run can have no order number against which the time can be booked, the best plan is that adopted by many firms of looking upon all draughtsmen's wages as part of the Establishment Charges, and not as part of the cost of the jobs.

All workmen's travelling expenses and petty cash disbursements which are chargeable against contracts should be posted to an "Expenses Chargeable Account" in the Nominal or Private Ledger, at the same time entering the items in the "Expenses Chargeable" column in the Cost Ledger, balancing the account monthly as between the Private Ledger and Cost Ledger.

OUTDOOR WAGES AND EXPENSES.

Before leaving the subject of Wages, it may be as well at this point to deal with the erection at site of the various contracts. As regards the wages themselves in connection with the erection there is very little difficulty. The foreman in charge of each job sends each week to the Works Office a Weekly Time Sheet, showing the men's time and amount of wages payable, together with any expenses that may have been incurred at the site, the total of which is charged up in the Cost Ledger to erection, the Erection column in the Cost Ledger being balanced periodically with the Erectors' Wages Account in the Private Ledger. A real difficulty, however, presents itself in the manner as to which the use of the erectors' tools and tackle employed in the erection of a job is to be charged.

For the purpose of arriving at the amount to be charged to the various jobs for use of erectors' tools and tackle, a book should be kept at the works by the storekeeper, called Erectors' Tools and Tackle Book, into which is entered to the debit of each job a description of all tools and tackle forwarded to the site of each particular job. Sometimes these tools will be sent on from one site to another; in such instances, however, a list is always sent to the works by the foreman in charge, which is debited and credited in the Erectors' Tool and Tackle Book to the particular contracts to which it refers. The items debited in the Erectors' Tool and Tackle Book are priced out at cost if newly purchased, or, if transferred from some other job, at the valuation price at date of transfer, all tools used on a job being valued at the completion of the job. The Erectors' Tool and Tackle Book will thus show the value of all tools and tackle used in connection with the erection of each job at the commencement and completion of the erection, the difference being charged to the job for use of tools and tackle, and credited to Erectors' Tool Account in the Private Ledger.

As a rule, however, such credits are never actually made in the financial books until the end of the year, when the books are closed.

SALES.

It may be as well before closing this chapter to make a few comments regarding Sales. The Sales Book should be provided with a Weight column, also a Rate column, in addition to the usual Money column, the actual weights of all material invoiced being entered in the Sales Book, which is totalled monthly and posted in the ordinary way to the credit of Sales Account. As each entry is made in the Sales Book the total value of the invoice, together with the weight of material invoiced, is simultaneously entered in the Cost Ledger in the Value Invoiced column, to whichever contract it refers, giving a reference to the folio in the Sales Book. The advantage gained by entering up Sales in the Cost Ledger in this manner will be apparent when the time arrives for the preparation of the Manufacturing Account, as the result of each individual job has to be got out separately.

CHAPTER III.

SHOP EXPENSES & ESTABLISHMENT CHARGES.

THE problem of apportioning indirect expenditure is a much discussed one, and a great difference of opinion exists as to the most accurate method of dealing with such expenditure. Before attempting to lay down any basis on the matter, it would perhaps be as well to differentiate between Shop Expenses and Establishment Charges, and ascertain where the line is to be drawn between these two items—which items are chargeable to Shop Expenses and which items are to be treated as Establishment Charges. Shop Expenses should embrace all expenditure incurred in running the shop, by which is meant the upkeep of the plant and machinery, and the shop generally, as apart from the administrative expenditure, or, in other words, Establishment Charges. The items which go to make up Shop Expenses are as follow:—

Foremen's Wages.

Unproductive Wages (such as Crane Drivers, Loco. Drivers, Storekeeper, Timekeeper, &c.).

Repairs to Buildings (including Material and Wages).

Repairs to Plant and Machinery (including Material and Wages).

Coal and Coke.

Fuel (Oil for heating rivets, &c.).

Water.

Lighting.

Yard Expenses.

Unchargeable Carriage.

Depreciation.

Neither Rent nor Rates and Taxes should be included in Shop Expenses. The turnover in the shop has no bearing or influence on Shop Rent, Rates, or Taxes, but has a distinct bearing on the items mentioned in the above schedule. Rent, Rates, and Taxes will therefore go to form part of Establishment Charges.

Having arrived at a distinction between the two, it is evident that Shop Expenses form part of the cost of all jobs, while Establishment Charges are really a charge against manufacturing profits.

When drawing up an estimate for tendering purposes it was seen that we allowed for Shop Expenses and Establishment Charges by covering for them on a percentage basis (*i.e.*, a percentage on labour).

Shop Expenses certainly have a relation to labour; but it may be argued, What relation have Establishment Charges to labour? and this may be best reasoned out in the following manner:—

Both Shop Expenses and Establishment Charges must be covered for when tendering for a contract. Let it be taken for granted, then, that we are tendering for a job, how are we to estimate the amount of Shop Expenses, and also the amount of Establishment Charges which are created by or applicable to that specific job? Labour has more direct bearing on Shop Expenses than material, or weight of material, and as Shop Expenses appear to be more closely associated with labour than with any of the other items mentioned in the estimate, it would

follow that the ideal way of covering for Shop Expenses in an estimate is by allowing for the same by a percentage on labour basis.

Establishment Charges, however, present an even greater difficulty as regards covering for same in an estimate. How are we to estimate the amount of Establishment Charges that will be incurred by building a certain bridge, or making a certain number of articles? As was seen in the illustration, they were covered in the same manner as Shop Expenses—viz., by a percentage on the labour—and it may be argued that labour has no bearing on such items as Rent, Salaries, Insurance, Rates and Taxes, and other items which go to make up Establishment Charges. Against this argument, on the other hand, it may be said that labour has as much bearing on Establishment Charges as any other item in the estimate.

It was seen that Shop Expenses and Establishment Charges were covered for in the estimate by the percentage at which these worked out at for the previous year; and it might be argued, Why not ascertain the actual amount of Shop Expenses and Establishment Charges for the current year, and base your estimate on these figures? The reply to which would be that in the estimate the calculation must be based on a year's figures, and we have based our calculation on the actual percentage at which the Shop Expenses and Establishment Charges worked out at on the previous year's figures, whereas were we to base our estimate on figures representing the actual Shop Expenses for the current year at the date of making out the estimate we have to estimate what the total current year's expenses would amount to.

In other words, let it be assumed we have just concluded a financial year, and that at the end of the first month of the new

financial year we are about to prepare a tender. It is contended that under such circumstances it is more correct to reserve for Shop Expenses in the estimate on a basis of the actual figures for the past twelve months than on an estimate of what the Shop Expenses for the next twelve months will amount to.

Reasoning on these lines, it is difficult to see what is to be gained by advocating, as some writers do, the necessity of preparing a monthly Shop Expenses Account. To do so is going to involve a great number of cross entries every month, and would also tend to confusion at the end of the year, when it would be found that a great many adjustments had to be made. In a well-equipped and organised shop the Shop Expenses and Establishment Charges should not vary to such an extent that it is necessary to ascertain these charges either weekly or monthly. It is known to be quite sufficient to ascertain what these charges are quarterly; at the same time, the principle of actually compiling the Shop Expenses Account quarterly is not advocated, and it is recommended that the cross entries be not made until the end of the year.

From a costing point of view, Shop Expenses and Establishment Charges must be treated quite separately, as the one forms part of the cost of a job, the other being a charge against Manufacturing Profits. This will be best illustrated by taking as example a firm of constructional engineers, who at the end of a financial year are about to prepare their annual accounts, and who find that they have a considerable number of incomplete contracts on hand in the various stages of construction, some of which it will be impossible to strike a balance on, and which it is evident will require to be carried forward into the next year's accounts as Contracts in Progress at cost to date, and in order to effect this the exact cost to date of each contract must be got out separately, which cost must, of course, include

a portion of Shop Expenses, as it is obviously quite unfair to charge against profits the portion of Shop Expenses applicable to contracts in progress. It therefore follows that some method must be adopted by which the Shop Expenses can be equitably distributed on the various orders. Whatever system is adopted, it must have some foundation; and of all the recent methods exploited in this direction, such as Machine Rates, &c., the opinion is held that the time-honoured method of charging up Shop Expenses on a labour basis can be upheld, and will bear comparison with any other method put forward.

It is not intended to discuss the merits of one system against another, but rather to advocate the system which it is thought will best meet the requirements of an engineering shop of this description, and the method adopted of distributing Shop Expenses over the various jobs is on a labour basis, each job bearing its portion of Shop Expenses according to the amount of labour expended thereon, a percentage being arrived at by dividing the Shop Expenses for the year by the total Productive Wages for the same year. For example, if the total Productive Wages amount to £30,000 and the Shop Expenses to £15,000, this would mean a charge to each job at the rate of 50 per cent. on the labour expended thereon to cover Shop Expenses.

The past year's figures are therefore taken both as a basis for tendering and as a basis for costing during the year, on the assumption that it is more correct to work on actual figures of a previous year than on estimated figures for the current year.

Establishment Charges are, stated briefly, composed of the items which form the debit side of the Profit and Loss Account, and do not constitute part of the cost of a job, but a charge against profits.

CHAPTER IV.

COST SHEETS AND THEIR RELATION TO THE MANUFACTURING ACCOUNT.

It may be well at this point to make a survey of the ground covered in the previous chapters before dealing with the Cost Sheets and Final Accounts, as in an undertaking of this description it is necessary that the Cost Accounts be of such a nature as to facilitate the preparation of the annual accounts.

Turning, then, to the Cost Ledger, we have the cost of each individual order under the various heads—*i.e.*, we know exactly the Material, Labour, &c., expended on the various contracts,

Fig. 9.— I.—CONTRACTS ESTIMATED TO

Contract No.	Description of Contract	*Amount Estimated to complete at 30th June 1904*	Steel and Iron	Other Material direct	Material from Stores	Rivets	Paint	Expenses Chargeable (Travelling, &c.)	Labour	Shop Expenses, 50% on Labour
		£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
41	L.B. & S.C. Railway— Bridge, at 8 m. 2 ch. ..	*350 0 0*	..	..	15 0 0	18 0 0	20 0 0	15 0 0	..	..
47	L.B. & S.C. Railway— Bridge, at 12 m. 3 ch...	*480 0 0*	..	..	10 0 0	22 0 0	25 0 0	20 0 0	..	..
49	Preston & Co.— 20 Steel Tanks	*570 0 0*	..	..	25 0 0	58 0 0	30 0 0	20 0 0	..	..
61	Adams & Co.— Steel Pipes	*150 0 0*	..	..	..	..	..	5 0 0	..	..
63	Bishop & Co.— Louvre Blades	*70 0 0*	..	..	..	..	..	..	..	..
65	Bishop & Co.— Steel Troughs	*130 0 0*	..	..	..	..	..	5 0 0	..	..
66	Great Western Ry. Co.— Bridge at—— ..	*250 0 0*	..	..	..	22 0 0	5 0 0	13 0 0	..	..
	£	*2,000 0 0*	..	..	50 0 0	120 0 0	80 0 0	78 0 0	..	..

and these items of cost are so classified in the Cost Ledger under the various headings as to render them reconcilable as far as possible with their controlling accounts in the Nominal Ledger.

The Cost Ledger therefore forms the basis of the Manufacturing Account, and, after preparing a Trial Balance of the financial books, the first step towards the preparation of a Manufacturing Account will be the extraction from the Cost Ledger —on to Cost Sheets—of the particulars of each individual contract. These Cost Sheets will, of course, bear practically similar headings to the Cost Ledger (see Cost Sheets, Figs. 9, 10, and 11), so that the total of each column on the Cost Sheets can be reconciled with its controlling account in the Trial Balance.

Figs. 9, 10, and 11 show the different sections of the Cost Sheets, illustrated with figures and a Manufacturing Account prepared therefrom, which will be found on p. 34.

Balance

COMPLETE AT 30th JUNE 1904.

Erectors' Wages	Use of Erectors' Tools and Tackle	Carriage and Freight			Total Cost since 30th June 1904	Sales Value Invoiced since 30th June 1904	*Values taken not Invoiced at 30th June 1904*		Manufacturing Loss	*Manufacturing Profit*
£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
200 0 0	100 0 0	65 0 0	..	..	433 0 0	450 0 0	*450 0 0*	..	83 0 0	
300 0 0	110 0 0	65 0 0	..	..	552 0 0	700 0 0	*700 0 0*	..	72 0 0	
190 0 0	190 0 0	80 0 0	..	..	593 0 0	1,850 0 0	*1,450 0 0*	..	..	*377 0 0*
140 0 0	10 0 0	..	..	..	155 0 0	200 0 0	*200 0 0*	..	5 0 0	
..	..	70 0 0	..	..	70 0 0	..	..	..	..	
115 0 0	20 0 0	..	..	..	140 0 0	..	..	..	10 0 0	
55 0 0	20 0 0	90 0 0	..	..	205 0 0	200 0 0	*200 0 0*	..	..	*45 0 0*
1,000 0 0	450 0 0	370 0 0	..	..	2,148 0 0	3,400 0 0	*3,000 0 0*	..	170 0 0	*422 0 0*
										170 0 0
										£252 0 0

Fig. 10.—

II.—CONTRACTS IN PROGRESS TAKEN AT COST AT 30th JUNE 1904.

Contract No.	Description of Contract	Cost at 30 June 1904 *less* Value Invoiced	Steel and Iron	Other Material direct	Material from Stores	Rivets	Paint	Expenses Chargeable (Travelling, &c.)	Labour	Shop Expenses 50% of labour
		£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
67	L.B. & S.C. Railway— Victoria Extensions ..	9,000 0 0	1,000 0 0	1,500 0 0	800 0 0	500 0 0	80 0 0	50 0 0	2,000 0 0	1,000 0 0
68	Egyptian Government— Steel Pipes	3,000 0 0	4,800 0 0	500 0 0	700 0 0	200 0 0	40 0 0	10 0 0	1,500 0 0	750 0 0
71	Indian Government Ry.— Bengal Bridges ..	800 0 0	4,500 0 0	2,000 0 0	500 0 0	800 0 0	120 0 0	20 0 0	2,000 0 0	1,000 0 0
73	G.E. Railway— Steel Troughs	200 0 0	1,000 0 0	500 0 0	100 0 0	80 0 0	10 0 0	..	400 0 0	200 0 0
76	G.W. Railway— Steel Troughs	500 0 0	1,200 0 0	500 0 0	200 0 0	80 0 0	10 0 0	..	500 0 0	250 0 0
78	Holland & Co.— Steel Pipes	500 0 0	3,000 0 0	500 0 0	300 0 0	140 0 0	40 0 0	10 0 0	500 0 0	250 0 0
80	Ford & Co.— Crane Girders	300 0 0	500 0 0	500 0 0	100 0 0	50 0 0	20 0 0	..	200 0 0	100 0 0
82	L.B. & S.C. Railway— Swing Bridge at——	200 0 0	2,000 0 0	2,000 0 0	500 0 0	150 0 0	80 0 0	..	1,150 0 0	575 0 0
83	L B. & S.C. Railway— Swing Bridge at——	100 0 0	2,000 0 0	2,000 0 0	300 0 0	150 0 0	100 0 0	50 0 0	1,150 0 0	575 0 0
84	G.E. Railway— Extensions at—— ..	100 0 0	3,000 0 0	4,000 0 0	500 0 0	150 0 0	150 0 0	40 0 0	1,500 0 0	750 0 0
85	G.E. Railway Co.— Bridge at—— ..	100 0 0	3,000 0 0	2,000 0 0	500 0 0	450 0 0	200 0 0	40 0 0	1,500 0 0	750 0 0
86	Midland Railway Co.— Extensions at—— ..	200 0 0	4,000 0 0	5,000 0 0	500 0 0	250 0 0	350 0 0	80 0 0	1,600 0 0	800 0 0
	£	15,000 0 0	30,000 0 0	21,000 0 0	5,000 0 0	3,000 0 0	1,200 0 0	300 0 0	14,000 0 0	7,000 0 0

Erectors' Wages	Use of Erectors' Tools and Tackle	Carriage and Freight	*Amount estimated to complete at 30 June 1905*		Total Cost	Sales Value	*Values taken at 30 June 1905 not Invoiced*	Contracts in Progress at 30 June 1905 at cost, *less* Value Invoiced	Manufacturing Loss	*Balance* Manufacturing Profit
£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
1,000 0 0	150 0 0	300 0 0	*500 0 0*	..	17,880 0 0	23,000 0 0	..	..	..	*5,120 0 0*
1,000 0 0	..	400 0 0	..	..	12,900 0 0	8,000 0 0	..	4,900 0 0	..	
1,500 0 0	..	400 0 0	..	..	13,640 0 0	16,000 0 0	..	..	..	*2,360 0 0*
500 0 0	..	30 0 0	..	..	3,020 0 0	3,500 0 0	..	..	..	*480 0 0*
500 0 0	..	50 0 0	..	..	3,790 0 0	4,000 0 0	..	..	..	*210 0 0*
500 0 0	..	100 0 0	..	..	5,840 0 0	7,500 0 0	..	..	..	*1,660 0 0*
..	..	20 0 0	..	..	1,790 0 0	1,500 0 0	..	..	290 0 0	
1,000 0 0	100 0 0	80 0 0	*300 0 0*	..	8,135 0 0	7,000 0 0	*2,000 0 0*	..	..	*865 0 0*
800 0 0	50 0 0	100 0 0	*500 0 0*	..	7,875 0 0	6,000 0 0	*1,500 0 0*	..	375 0 0	
1,200 0 0	50 0 0	150 0 0	*500 0 0*	..	12,090 0 0	12,500 0 0	..	..	..	*410 0 0*
500 0 0	50 0 0	150 0 0	*200 0 0*	..	9,440 0 0	9,000 0 0	..	..	440 0 0	
1,500 0 0	100 0 0	250 0 0	*500 0 0*	..	15,130 0 0	16,000 0 0	..	..	..	*870 0 0*
10,000 0 0	500 0 0	2,030 0 0	*2,500 0 0*	..	111,530 0 0	114,000 0 0	*3,500 0 0*	4,900 0 0	1,105 0 0	*11,975 0 0*
										1,105 0 0
										10,870 0 0

Fig. 11.— **III.—CONTRACTS COMMENCED SINCE 30th JUNE 1904.**

Contract No.	Description	Steel and Iron	Other Material direct	Material from Stores	Rivets	Paint	Expenses Chargeable (Travelling, &c.)	Labour	Shop Expenses, 50% on Labour
		£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
90	Baku Oil Company—Tanks	4,000 0 0	1,500 0 0	30 0 0	180 0 0	90 0 0	50 0 0	800 0 0	400 0 0
91	Lanc. & York. Ry. Co.—Bridge at—— ..	2,000 0 0	500 0 0	20 0 0	80 0 0	40 0 0	..	90 0 0	45 0 0
92	South Eastern Ry.—Extensions at—— ..	3,000 0 0	1,000 0 0	50 0 0	80 0 0	40 0 0	..	100 0 0	50 0 0
93	Young & Co.—Pipes	3,000 0 0	200 0 0	100 0 0	80 0 0	50 0 0	30 0 0	..	..
94	Kennedy & Co.—Louvre Blades ..	1,500 0 0	50 0 0	30 0 0	..	50 0 0	..	100 0 0	50 0 0
95	Braithwaite & Co.—Extension of Premises	2,500 0 0	100 0 0	100 0 0	100 0 0	80 0 0	10 0 0	750 0 0	375 0 0
96	Harrap & Co.—Troughs	1,000 0 0	50 0 0	40 0 0	50 0 0	..	..	230 0 0	115 0 0
97	Harrap & Co.—Turntable	150 0 0	50 0 0	20 0 0	50 0 0	20 0 0	5 0 0	84 0 0	42 0 0
98	S.E. Railway Co.—Turntable	150 0 0	40 0 0	20 0 0	40 0 0	15 0 0	..	80 0 0	40 0 0
99	Anderson & Co.—Monolith Shoes ..	300 0 0	30 0 0	20 0 0	15 0 0	10 0 0	4 0 0	40 0 0	20 0 0
100	Baku Oil Company—Tanks	2,000 0 0	80 0 0	80 0 0	90 0 0	60 0 0	10 0 0	300 0 0	150 0 0
		19,600 0 0	3,600 0 0	510 0 0	765 0 0	455 0 0	109 0 0	2,574 0 0	1,287 0 0

Erectors' Wages	Use of Erectors' Tools	Carriage and Freight		Amount Estimated to Complete at 30th June 1905	Total Cost	Sales Value	Values taken at 30th June 1905 not Invoiced		Balance: Contracts in Progress at 30th June 1905 at Cost, less Value Invoiced	Manufacturing Loss	Manufacturing Profit
£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
..	..	300 0 0	..	..	7,350 0 0	9,000 0 0	..	..	..	..	*1,650 0 0*
..	..	..	..	..	2,775 0 0	1,500 0 0	..	..	1,275 0 0	..	..
..	..	..	..	..	4,320 0 0	2,000 0 0	..	..	2,320 0 0	..	..
..	..	..	..	..	3,460 0 0	..	..	..	3,460 0 0	..	..
..	..	..	..	..	1,780 0 0	2,500 0 0	..	..	..	..	*720 0 0*
400 0 0	50 0 0	100 0 0	..	50 0 0	4,615 0 0	5,000 0 0	*500 0 0*	..	..	..	*885 0 0*
..	..	50 0 0	..	..	1,535 0 0	2,000 0 0	..	..	..	..	*465 0 0*
30 0 0	..	15 0 0	..	10 0 0	476 0 0	600 0 0	..	..	..	..	*124 0 0*
20 0 0	..	15 0 0	..	..	420 0 0	600 0 0	..	..	..	..	*180 0 0*
..	..	40 0 0	..	..	479 0 0	..	..	..	479 0 0	..	..
..	..	150 0 0	..	..	2,920 0 0	4,000 0 0	..	..	..	..	*1,080 0 0*
450 0 0	50 0 0	670 0 0	..	60 0 0	30,130 0 0	27,200 0 0	*500 0 0*	..	7,534 0 0	..	*5,104 0 0*

It was shown earlier in the book that the cost of each individual contract had to be got out separately (before preparing the Manufacturing Account), owing to the fact that all jobs are not in the same stage of construction; some perhaps have just been entered upon, while others are nearly complete, not only therefore will each contract be treated individually, but the Cost Sheets must be divided into different sections so as to allow the contracts to be classified according to their standing.

As will be seen from Figs. 9, 10, 11, and 12, the different sections into which the Cost Sheets are divided are as follows:—

Fig. 9.—I. Contracts estimated to complete (at 30th June 1904).

Fig. 10.—II. Contracts in progress at cost (less value invoiced) at 30th June 1904.

Fig. 11.—III. Contracts commenced since 30th June 1904.

Fig. 12.—IV. Work for selves.

Fig. 12.— IV.—WORK FOR SELVES.—CAPITAL EXPENDITURE.

Order No.	Description	Steel and Iron	Other Material direct	Material from Stores	Rivets	Paint	Expenses Chargeable	Labour	Shop Expenses, 50% on Labour	Total Cost
		£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
99 B	Extension of Railway Siding ..	80 ..	50 0 0	10 0 0	..	..	..	40 0 0	20 0 0	120 0 0
101 B	Accumulator for Hydraulic Press..	80 0 0	10 0 0	10 0 0	40 0 0	5 0 0	..	40 0 0	20 0 0	205 0 0
103 B	New Paint Shop	40 0 0	20 0 0	5 0 0	10 0 0	5 0 0	..	50 0 0	25 0 0	155 0 0
105 B	Additions to Stores	140 0 0	80 0 0	15 0 0	20 0 0	10 0 0	..	50 0 0	25 0 0	340 0 0
107 B	Oil Tank..	40 0 0	..	15 0 0	15 0 0	5 0 0	..	30 0 0	15 0 0	115 0 0
109 B	Extension of Main Shop	500 0 0	150 0 0	40 0 0	80 0 0	30 0 0	..	150 0 0	75 0 0	1,025 0 0
111 B	Fixing New Boiler	..	500 0 0	50 0 0	..	..	10 0 0	30 0 0	15 0 0	605 0 0
		£800 0 0	£810 0 0	£140 0 0	£165 0 0	£55 0 0	£10 0 0	£390 0 0	£195 0 0	£2,565 0 0

NOTE.—The above is then analysed, viz. :—

	£ s d	£ s d	£ s d
Order 99B Additions to Yard and Sidings ..	..	120 0 0	
Order 101B Additions to Machinery and Plant ..	205 0 0		
Order 111B Additions to Machinery and Plant ..	605 0 0		
Order 107B Additions to Machinery and Plant	115 0 0		
		925 0 0	
Order 103B Additions to Buildings	155 0 0		
Order 105B " "	340 0 0		
Order 109B " "	1,025 0 0		
		1,520 0 0	
			£2,565 0 0

The Journal entries to clear same being :—

		Dr.	Cr.
		£ s d	£ s d
Work for Selves Account	..	2,565 0 0	
To Steel and Iron	..	..	800 0 0
" Other Material direct	..	..	810 0 0
" Material from Stores	..	..	140 0 0
" Rivets	..	..	165 0 0
" Paint	..	..	55 0 0
" Expenses Chargeable	..	..	10 0 0
" Labour (Wages)	..	..	390 0 0
" Shop Expenses	..	..	195 0 0
		£2,565 0 0	£2,565 0 0

			£ s d
Additions to Sidings	..	Dr.	120 0 0
" " Machinery and Plant		Dr.	925 0 0
" Buildings ..	..	Dr.	1,520 0 0
To Work for Selves	..	Cr.	..
			2,565 0 0
			£2,565 0 0

The above date may at first sight be rather misleading, 30th June 1904 being presumably the date of the Manufacturing Account prior to the one which it is now proposed to draw up. Thus if we were about to prepare accounts for the year ending 30th June 1905, the first step to be taken would be the preparation of Cost Sheets with the above headings.

A few explanatory remarks regarding the various sections, and the reasons for so dividing them, may not be amiss, therefore taking them in their order we have first :—

I.—*Contracts estimated to complete (at 30th June 1904).*

At the end of each financial year there are always certain contracts which are not actually completed. For example, a job, say, has left the shop, and at the date of the Balance Sheet is in course of erection and so near completion as to justify it being treated as if it were completed; what is done then is to estimate the amount which it is thought will take to complete the job. This estimate is, of course, made by a practical man, not by the accountant; as, for instance, by the superintendent engineer in charge of the particular job, who as a rule can tell pretty accurately exactly how long it is going to take his men before they have "cleared out" of the particular job in question. This information being obtained, the next step will be to ascertain if there are any outstanding liabilities in connection with the job, such as further carriage to pay, the account for which has not yet come to hand. Various items may have even been charged up to the job after the close of the financial year but just prior to the preparation of the accounts. After taking all precautions for including outstanding charges, such as have been mentioned, which will require to be met in connection with the job as a rule the amount required to complete the job can be estimated so near that it will be found on completion not to be estimated so near that it will be found on completion not to be "far out" of the actual amount. This amount is then charged

up to the job on the Cost Sheet under the heading "Amounts estimated to complete," and brought forward into the next year's accounts as a liability, the difference between these liabilities and the actual costs being a further profit or loss. Very frequently in such jobs the total value of the contract may not have been invoiced at the date of closing the Day Book, and it will be necessary to take credit for the balance of value not invoiced. Having ascertained the amount of such value, it is entered in the Cost Sheet under the heading "Values taken but not invoiced," the total of this column being brought forward into the next year's accounts as a debit against Sales. This Schedule—viz., Contracts estimated to complete at 30th June 1904—will therefore represent the contracts on which a balance was struck on these lines at the close of that financial year.

II.—*Contracts in Progress at cost (less value invoiced, if any) at 30th June* 1904.

This section represents all contracts upon which no balance was struck at the date of the preceding Balance Sheet, but which were taken into the Balance Sheet at cost to date (less the value invoiced at that date, if any). As will be seen therefore contracts are brought forward from one year to another in one of two forms, either as contracts estimated to complete or contracts in progress at cost to date (less value invoiced, if any), while Section III. represents all contracts commenced since the close of the last financial year.

IV.—*Work for Selves.*

This section is sub-divided as between Capital Expenditure and Maintenance, all orders representing capital expenditure being grouped together apart from the maintenance orders, the capital items forming part of the additions to Capital for the year, while the order numbers representing maintenance are charged to Shop Expenses.

Fig. 12a.—

IV.—WORK FOR SELVES—MAINTENANCE AND UP-KEEP.

Order No.	Description	Labour	Material from Stores	Paint
		£ s d	£ s d	£ s d
103A	Repairs to Buildings	80 0 0	5 0 0	20 0 0
105A	Upkeep of Yard and Sidings	70 0 0	20 0 0	
106A	Foremen's Wages	500 0 0		
100A	Unproductive Wages	1,500 0 0		
*107A	Repairs to Machinery and Plant, viz. :—			
	Main Engine and Boiler	50 0 0	40 0 0	
	Loco. No. 1	30 0 0	20 0 0	
	Cranes (Steam travelling)	50 0 0	30 0 0	
	Dynamos	100 0 0	80 0 0	
	Cranes (Overhead Electric)	90 0 0	80 0 0	
	Drilling Machine No. 2	30 0 0	5 0 0	
	" " No. 4	15 0 0	4 0 0	
	" " No. 8	20 0 0	3 0 0	
	" " No. 10	10 0 6	8 0 0	
	" " No. 11	8 0 0	6 0 0	
	Punching Machine No. 3	15 0 0	1 0 0	
	" " No. 7	20 0 0	3 0 0	
	" " No. 9	8 0 0	2 0 0	
	" " No. 12	10 0 0	4 0 0	
	" " No. 15	11 0 0	3 0 0	
	Large Press, No. 80	50 0 0	10 0 0	
	Hot and Cold Saws	40 0 0	30 0 0	
	Smiths' Hearths	15 0 0	8 0 0	
		£2,722 0 0	£362 0 0	£20 0 0

* NOTE.—All Repairs to Machinery and Plant executed by the workmen of the Company are chargeable to Order 107A. Each machine in the shop, however, has a distinct number by which it is known, and there is also a separate Account for each machine in the Cost Ledger (a special Cost Ledger being kept for Maintenance and Upkeep). In recording his time a workman is required to state in his Time Book the number of the Machine on which he was engaged.

The Journal entry to clear the above would, of course, be as follows :—

		£ s d	£ s d
Shop Expenses	*Dr.*	3,104 0 0	
To Wages			2,722 0 0
" Stores Stock			362 0 0
" "			20 0 0
		£3,104 0 0	£3,104 0 0

Fig. 12 illustrates the Capital Expenditure portion of this section, showing the necessary Journal entries to clear same, the Maintenance portion being illustrated by Fig. 12A. There should be a separate Cost Ledger for all orders representing

Fig. 13.— MANUFACTURING ACCOUNT, Year ending 30th June 1905.

1905 30 June		I. Contracts Estimated to complete at 30 June 1904	II. Contracts in Progress at Cost, *less* Value Invoiced at 30 June 1904	III. Contracts commenced since 30 June 1904	Total			I. Contacts Estimated to complete at 30 June 1904	II. Contracts in Progress at Cost, *less* Value Invoiced at 30 June 1904	III. Contracts commenced since 30 June 1904	Total
		£ s d	£ s d	£ s d	£ s d	1905 June 30		£ s d	£ s d	£ s d	£ s d
	To Cost to date (*less* Value Invoiced) at 30 June 1904 ..	..	15,000 0 0	..	15,000 0 0		By Sales Value .. Values taken at 30 June 1905 but not Invoiced ..	3,400 0 0	114,000 0 0	27,200 0 0	144,600 0 0
	„ Steel and Iron ..	..	30,000 0 0	19,600 0 0	49,600 0 0			..	3,500 0 0	500 0 0	4,000 0 0
	„ Other Material direct ..	..	21,000 0 0	3,600 0 0	24,600 0 0		„ Contracts in Progress at Cost, *less* Value Invoiced (if any) ..	..	4,500 0 0	7,534 0 0	12,434 0 0
	„ Material from Stores ..	50 0 0	5,000 0 0	510 0 0	5,560 0 0						
	„ Rivets	120 0 0	3,000 0 0	765 0 0	3,885 0 0						
	„ Paint	80 0 0	1,200 0 0	453 0 0	1,733 0 0						
	„ Expenses:										
	„ Chargeable ..	78 0 0	300 0 0	109 0 0	487 0 0						
	„ Labour	..	14,000 0 0	2,574 0 0	16,574 0 0						
	„ Shop Expenses	..	7,000 0 0	1,287 0 0	8,287 0 0						
	„ Erectors' Wages ..	1,000 0 0	10,000 0 0	450 0 0	11,450 0 0						
	„ Use of Erectors Tools ..	450 0 0	500 0 0	50 0 0	1,000 0 0						
	„ Carriage and Freight ..	370 0 0	2,030 0 0	670 0 0	3,070 0 0						
	„ Amount estimated to complete at 30 June 1905 ..	..	2,500 0 0	60 0 0	2,560 0 0						
		2,148 0 0	111,530 0 0	30,130 0 0	143,808 0 0		*Less* Values taken at 30 June 1904, but not Invoiced ..	3,400 0 0	122,400 0 0	35,234 0 0	161,034 0 0
	Less Amount estimated to complete at 30 June 1904 ..	2,000 0 0	..	..	2,000 0 0			3,000 0 0	..	..	3,000 0 0
		148 0 0	111,530 0 0	30,130 0 0	141,808 0 0			400 0 0	122,400 0 0	35,234 0 0	158,034 0 0
	To Balance (Profit) carried to Profit and Loss A/c..	252 0 0	10,870 0 0	5,104 0 0	17,076 0 0		By Scrap Sold ..	..	..	..	850 0 0
		£400 0 0	122,400 0 0	35,234 0 0	158,884 0 0			£400 0 0	122,400 0 0	35,234 0 0	158,884 0 0

Repairs (Work for selves). There is, however, nothing calling for special comment with regard to this, only two columns being required, one for Labour (Wages) and the other for Material from Stores.

Having therefore made out Cost Sheets with headings for the respective sections, it will be necessary before extracting the costs from the Cost Ledger to turn to the item Contracts in Progress at 30th June 1904 in the Trial Balance, dated 30th June 1905, as this figure represents the position of the contracts at the close of the preceding year, and will therefore form the starting point for the year in hand.

This will be best illustrated by reference to the Manufacturing Account. (For form of Manufacturing Account see Fig. 13.)

From the Manufacturing Account it will be seen that the figures representing contracts brought forward from the year 1904 are as follows:—

Dr. Contracts in progress at cost (less value invoiced at 30th June 1904), £15,000.

Dr. Values taken credit for, but not invoiced at 30th June 1904, £3,000.

Cr. Amounts estimated to complete at 30th June 1904, £2,000.

Taking the Cost Sheets *seriatim*, we have—

I.—*Contracts estimated to complete at 30th June 1904.*

The total of these estimated amounts as shown above is £2,000, and the first column of this sheet shows the amounts against the several contracts thus treated (these individual figures being taken from the 1904 Cost Sheets), the difference between these estimated amounts and the actual costs since the

date of the estimate to complete being a further profit or loss, as the case may be, taking into account, of course, any further value which may have arisen through an "extra" to the contract being chargeable, and the values put through since 30th June 1904, less the values taken credit for but not invoiced at that date.

II.—*Contracts in progress, taken at cost (less value invoiced, if any), at 30th June* 1904.

The total figure representing these contracts was shown to be £15,000. The details which compose this total are therefore the starting point for this Cost Sheet, and the first column of the sheet shows the several contracts and their corresponding amounts, which total to £15,000.

III.—*Contracts commenced since 30th June* 1904.

There is nothing to call for comment at this stage in connection with this sheet, no figures being brought forward from the previous year's Cost Sheets, the contracts only being entered upon at the commencement of the present financial year.

Having therefore got the figures—representing the contracts which were brought forward from the previous year—set out opposite the individual contracts under their respective sections, the costs may be extracted from the Cost Ledger, the totals of the various columns of the Cost Ledger being inserted in the corresponding columns in the Cost Sheets opposite each individual contract. These, when added collaterally, will show the total cost of each contract—in the case of Sheet I. the total cost since 30th June 1904; and in the case of Sheet No. II., the total cost at 30th June 1905 (less the value invoiced at 30th June 1904). This can be adjusted between the Cost column and Value column, if thought necessary. Next to the Total Cost

column is the total value of the job, this figure also being obtained from the Cost Ledger, the values being analysed from the Sales Book monthly, and entered in the Cost Ledger to the individual contracts.

Having extracted all the costs from the Cost Ledger on to the Cost Sheets, before we can complete the Cost Sheets we have to determine which of the contracts we will be justified in striking a balance on—*i.e.*, the contracts which are actually completed, and the contracts which are so near completion that it is thought prudent to strike a balance on them (whether it be a profit or loss) by estimating the amount which it is thought will be required to complete the job. The method by which this amount is arrived at was explained earlier in the book.

Briefly, then, what we have to ascertain is as follows:—

(1) The contracts which are actually completed.

(2) The contracts which are to be estimated as complete.

(3) The contracts which will require to be carried forward as contracts in progress.

This having been decided, and the various amounts agreed upon as being necessary to reserve for completion of the jobs to be treated as completed, and duly entered in the "Estimated to complete at 30th June 1905" column, the sheets can then be completed, a balance being struck on all finished jobs; while all contracts that are to be treated as in progress are carried out into a special column headed Contracts in Progress taken at cost to date (less values invoiced, if any). Before, however, striking the balances on the contracts the columns on the Cost Sheets are totalled, and the totals agreed with their corresponding accounts in the Trial Balance. For example, the steel charged up as per the totals of the Steel columns on the Cost Sheets should balance exactly with the steel purchased as per

the Steel and Iron Account in the Trial Balance. In the same way all the columns on the Cost Sheets which have independent or controlling accounts in the Trial Balance are agreed—viz., Material Direct, Expenses Chargeable, Labour, Erectors' Wages; while the Shop Expenses column and "Use of Erectors' Tools" column agree, of course, with the total amount of Shop Expenses for the year, and the total amount chargeable for use of erectors' tools respectively, the Sales Value column being balanced with the Sales Account in like manner. The three columns representing material from stores—viz., Material from Stores, Rivets, and Paint—may, however, offer some difficulty in the way of balancing (as we will have stock-on-hand for these items to deal with). The most important factor towards this balancing of stores is the accurate pricing of materials, and for this reason stress was laid on this vital point earlier in the book when dealing with the issue of material from stores, when it was shown that all purchases of the nature of stores are entered in the Purchase Journal under one heading, Stores Stock, all invoices, however, coming under this heading being analysed into a Stores Analysis Book under various headings, thus keeping separate accounts, as it were, of the various articles purchased for stores; as, for instance, all Rivets will be gathered under one head, in the same way Paint, Oil, Bolts, and Nuts, and all such items which can be classified under separate accounts, items which cannot be easily classified coming under the heading of Sundries.

In the Trial Balance therefore we will have an item, Stores Stock Account, which represents all stores purchased, and at the same time we have an analysis of this account in the Stores Analysis Book. This analysis, forming the record from which prices are obtained for costing purposes, is also of great assistance in connection with balancing the Stores Stock Account at the end of the financial year, as by analysing the stock at the

end of the year in accordance with the different analyses represented by the Stores Analysis Book, different Goods Accounts, as it were, can be drawn up, and the difference between the stores used as shown by the Cost Accounts and the financial books, if great, can be narrowed down to certain items and traced in this manner. Much has been written lately on the subject of stores and stock tracing, some writers going so far as to insist on the keeping of debit and credit accounts for every different class of article kept in stock.

It will be noted that this method has not been advocated for the reason that, in the writer's opinion, there are many side issues in connection with this principle which render it impracticable; as, for instance, variation in price from time to time, loss in weight, shrinkage, evaporation, and fractional differences occurring by frequent charging out of small quantities, all of which, along with other reasons which could be cited, tending to throw out an accurate balance. From experience, the method suggested in this work has been found to be capable of being balanced within a few pounds in successive years.

After the totals of the columns on the Cost Sheets have been agreed with their controlling accounts in the Trial Balance the Manufacturing Account can then be proceeded with, and, having proved the accuracy of the Cost Sheets with the financial books, we have the assurance that everything has been charged up.

As will be seen from Fig. 13, the Manufacturing Account is drawn up in analytical form, showing the results of the different sections of the Cost Sheets, and embodies the totals of these sheets.

As will be seen, therefore, these Cost Sheets, which contain the actual results as shown in the Cost Ledger, not only show

at a glance the exact balance on each separate contract, but contain the necessary figures required for the preparation of the Manufacturing Account. Thus the Cost Ledger, while being a complete record from week to week of the cost of the various orders, is at the same time being compiled with the view in mind of its being finally merged into the shape of a Manufacturing Account. Nor does its sphere of usefulness end here, as it is of the greatest value to the manufacturer for future reference, and enables him, by a comparison of the actual costs with his estimates, to see exactly where he stands with each job during the time of its construction; or should a job prove unremunerative he can tell at a glance where the weak spot is, or where the Estimating Department has under-estimated the costs, and is guided thereby for similar work in the future.

Brevity has been aimed at throughout the book with the view of getting to the chief points in question without introducing the many intricacies connected with Cost Accounts.

Much might have been written on Stores and Stock Tracing, special articles having recently been published on this subject alone. It has therefore been considered advisable not to go too deeply into the matter in the present work, but to merely emphasise what is considered the most important side of the question—namely, the accurate pricing of the stores issued to the various orders.

Shop Expenses and Establishment Charges are also subjects on which different opinions are held by various writers, and a special chapter has been devoted to them. At the same time, it has not been thought necessary to discuss, or rather compare, one method with another, the reason for this attitude being that much depends on the circumstances under which the shop is run—such as the location of the shop and

exact nature of the business carried on, special conditions calling for special requirements.

It has not been thought essential to supply a complete list of all the books required—such as Cash Book, Petty Cash Book, forms of Order Books, &c.—on the assumption that those who find themselves confronted with the problem of Cost Accounts are sufficiently well instructed to deduce their own ideas as to these.

CHAPTER V.

THE PREMIUM SYSTEM OF REMUNERATION TO WORKMEN.

As a fitting conclusion to this work a chapter on the above subject, it is thought, should not be amiss. At the present day specialisation in the various industries has reached to such an extent that in the competition to secure orders the employer has frequently to cut his price so fine as to leave only a bare margin of profit, and is always on the lookout for some means which will enable him to reduce the cost of production, and when confronted with the problem as to how he can cheapen production he invariably turns his thoughts in the direction of his Wages Book, with a view to cutting down expenses, either by a reduction of the piecework rates or wages paid to the workmen. To reduce the piecework rates in any workshop is, however, by no means an easy matter, and, even if carried out effectively, will tend to dishearten the men, as they will naturally resent the reduction of their rates; on the other hand, whatever balance a workman earns on the Piecework System, the wage cost remains the same to the employer until he reduces the piecework rate.

What the Premium System aims at is a method of remuneration whereby the interests of both employer and employed are taken into equal consideration—namely, by giving the workman an incentive to earn a premium, plus his hourly rate of

wages at the same time, by so doing lessening the cost of production to his employer. The greater the saving effected by the workman under the Premium System the cheaper the production to the employer, and the greater scope for the workman to increase his wages. To the uninitiated this may at first sight appear rather a bold statement, but it is nevertheless the effect of the Premium System of remuneration.

The commending of the Premium System as against a well-founded Piecework System is a point upon which there has been much discussion in the engineering world. Some of the leading engineering firms in this country have resorted to the former method, and the writer has in mind at the present moment a firm employing over five hundred hands who introduced the Premium System into their workshop in place of the Piecework System then in vogue, with the view of cheapening production, and at the same time to consider the interests of the workmen, that they might feel such saving which they contributed to did not injure their interests, but rather improved them, and thus bring about a mutual feeling of confidence between the employer and the men, and whose expectations were thoroughly realised by the change.

The Premium System incites the workman to put forth his best efforts, and calls upon all his resources; at the same time, it leads the workman to suggest improvements and devise better methods regarding different operations, which, of course, should have their reward. Put briefly, the system may be described as a premium on energy and skill, as will be seen from the following explanation of the system:—

Each workman is paid a fixed hourly rate of wages, and a specified time is allotted to each job given out to him. If by his skill or energy he manages to complete the job in less time than the time allotted, he becomes entitled to a premium, vary-

ing in amount with the time saved; if, on the other hand, the workman is unable to complete the job in the allotted space of time, he is no loser thereby, as he receives his hourly rate of wages for the time worked, so that no matter how short a time may be allowed for a job the hourly rate of wages at least will be paid while engaged on that job, thereby preventing a premium on one job being lost through failure to make a premium on another. In the case of a job requiring the services of a squad of men, a time allowance is fixed for the complete job. If the total time taken by the squad is less than the time allowed a premium will be paid to each man in the squad. This premium will have the same relation to his time wages for the job as the time saved by the squad will have to the time allowed. From this it is evident that while a workman may increase his wages he cannot possibly be the loser by the introduction of the system, which possesses two main advantages, viz.:—

(1) It enables a workman to increase his wages by his own individual effort.

(2) The increased wages to the workman means at the same time a reduced cost of production to the employer.

Before going into the detailed working of the system a short sketch as to its origin may be of interest. According to literature on the subject a Mr. F. A. Halsey, of the Canadian Rand Drill Co., is credited with the original introduction of the Premium System of remunerating labour, while others have credited Mr. James Rowan, of Glasgow, with its introduction, some holding the opinion that the Rowan system was merely a diversion from the Halsey system. It is not the intention here, however, to discuss the question as to the exact origin of the system, but more to point out the fact that the original idea of the Premium System of remuneration is found in operation at

the present day in some of the foremost engineering shops in this country in various forms, the chief difference in form being the variation of method adopted in dividing the saving effected.

On initiating the system into a workshop it is customary to have handbills printed, setting out the form which it is proposed to adopt, for distribution among the workmen. Below an actual copy of such handbill is given, which briefly explains the working of the Premium System upon the foregoing basis.

PREMIUM SYSTEM OF REMUNERATION.

The present piecework system not having proved altogether satisfactory, owing (1) to a limit being placed on the balance paid, and (2) to the prices being reduced when large profits have been made, it has been decided to abandon this sysetm and to adopt the PREMIUM SYSTEM in its place.

The principle of the Premium System is that a Basis Price is fixed (which is in no case less than the present piecework price), and the workman is paid a percentage on his time equal to the percentage of saving effected on the basis price. For example, if the basis price is £12, and the time value on the job is £9, the saving is £3, which is 25%; then 25% on the time is paid as premium, which is the same thing as "time and a quarter." Or, with a basis price of £12, if the time value on the job is £6, the saving is £6, or 50%; then 50% on the time is paid as premium, which is the same thing as "time and a half."

The premium earned will be paid in full, no matter what it amounts to, and no reduction will be made in the basis price unless there be some radical change in machine methods of production.

..... WORKS,
....., *10th December* 1904.

The following table illustrates the working of the system as proposed in the foregoing handbill, taking the basis price as being fixed at £1, and the actual cost in wages ranging from 15s. to 5s., by way of example:—

Basis	Cost in Wages	Save	Premium Due	Amount of Premium	Saving to Employer	Wages plus Premium due to Workman
20/-	15/-	5/-	$\frac{5}{26}$ of 15/-	3/9	1/3	18/9
20/-	14/-	6/-	$\frac{6}{26}$ " 14/-	4/2	1/10	18/2
20/-	13/-	7/-	$\frac{7}{26}$ " 13/-	4/6	2/6	17/6
20/-	12/-	8/.	$\frac{8}{26}$ " 12/-	4/9	3/3	16/9
20/-	11/-	9/-	$\frac{9}{26}$ " 11/-	4/11	4/1	15/11
20/-	10/-	10/-	$\frac{10}{26}$ " 10/-	5/-	5/-	15/-
20/-	9/-	11/-	$\frac{11}{26}$ " 9/-	4/11	6/1	13/11
20/-	8/-	12/-	$\frac{12}{26}$ " 8/-	4/9	7/3	12/9
20/-	7/-	13/-	$\frac{13}{26}$ " 7/-	4/6	8/6	11/6
20/-	6/-	14/-	$\frac{14}{26}$ " 6/-	4/2	9/10	10/2
20/-	5/-	15/-	$\frac{15}{26}$ " 5/-	3/9	11/3	8/9

It was shown that under the Premium System the workman was paid his fixed hourly rate of wages; at the same time a time allowance was fixed, the workman being entitled to a premium on the time saved. In the foregoing illustration the basis price, as will be seen, is 20s. This basis price of 20s. is arrived at by multiplying the number of hours allowed for the job by the rate of wages paid to the workman to whom the job is given. For the sake of example let us assume that the time allowance for making an article, or number of articles, say six Lewis bolts, is fixed at 20 hours, and the smith who is going to execute the work is paid a fixed hourly wage at the rate of 1s. per hour, then the basis price would work out at 20s., as per the foregoing schedule. In order to thoroughly explain the foregoing schedule it is assumed that the workman in the first instance takes fifteen hours to finish his job, which at his hourly rate of wages—viz., 1s.—will make the cost in wages as per schedule 15s., thereby effecting a saving of 5s., and according to the handbill issued the workman is entitled to a premium by way of a percentage on his time equal to the percentage of saving effected on the basis price, which in this case will be $\frac{15}{26}$ of 15s., making the premium due to the workman 3s. 9d., which, added to his fifteen hours at 1s. per hour, makes a total

of 18s. 9d. due to him. It was stated earlier in the chapter that the greater the saving effected by the workman the cheaper the production to the employer, and this will be readily confirmed by a glance at the table of illustrations, but, at the same time, it may be noticed that the greater the saving the smaller the amount of wages, plus premium, is due to the workman. Nevertheless, it is to the workman's advantage to complete a job in as short a space of time as possible, as will now be shown.

The table is, of course, taken to an extreme limit for illustration purposes, as it is far from probable that a workman, however skilled, would be able to execute in five hours a job on which the time allowance was fixed at twenty hours. Let it, however, be assumed that by some unforeseen circumstances the workman executes the order in five hours, in which case, according to the table, the wages, plus premium due to him, would amount to 8s. 9d.; on the other hand, had he taken fifteen hours to execute the order, the wages, plus premium due to him, would have been 18s. 9d.; but by completing the work in five hours as against fifteen hours *he has other ten hours*, as it were, in which he may earn a further premium; and, for illustration purposes, say he is put on a similar order to the one just executed (but for double the quantity), working at the same rate he would execute the work in ten hours, and thereby earn a further 17s. 6d., making his total earnings for the fifteen hours 26s. 3d. as against 18s. 9d., or if he was even unable to earn a premium on his next order he would receive 1s. per hour for the next ten hours worked, making his wages up to 18s. 9d. By way of further illustration, say two workmen, A. and B., whose hourly rates of wages are alike, are working on similar orders, the basis price, of course, being the same. A., for some reason, takes fifteen hours to complete his job, and will according to the table therefore be entitled to 18s. 9d. B., however,

manages to complete his work in twelve hours, earning only 16s. 9d., at the same time having three hours in hand as compared with A., and for which, in the event of his failing to earn a balance on his next order, he will at least draw 1s. per hour, making his wages 19s. 9d. for fifteen hours worked, as compared with A.'s 18s. 9d., or an increase of 1s. earned by his own exertions, through completing his work in less time than his fellow-workman. From these illustrations it will be clearly seen that it is to the workman's advantage to execute his orders as speedily as possible, and by so doing increase his earnings.

The two main advantages claimed by the system were—

(1) That it enabled a workman to increase his wages by his own individual effort.

(2) That the increased wages to the workman meant a reduced cost of production to the employer.

The first advantage has, it is thought, been clearly demonstrated by the foregoing illustrations. Let us consider, then, the advantages claimed from an employer's point of view.

As will be seen from the table of illustrations, the shorter the period taken by the workman to complete his order the greater the saving to the employer, which means that the prime cost of his article becomes reduced. The decrease in the cost of production, however, does not stop here, as by getting the work quicker through the shop the employer is enabled to increase his output, and by so doing in this manner reduce the percentage of shop expenses on the various orders. Not only therefore is the prime cost reduced, but the net cost. A further and most important point is claimed in favour of the Premium System—namely, that by its introduction into a workshop there is brought about a feeling of goodwill and confidence between

employer and employed, engendering what is keenly sought after by all managers as an essential to success—co-operation.

The introduction of the Premium System into a workshop will create a new department—namely, a Time-Allowance or Rate-Fixing Department. The person in charge of this department must be a practical man, either a qualified engineer or an expert cost clerk, who is not only able to read a drawing, but has had considerable shop experience. Upon this department will devolve the responsibility of fixing the time allowance or basis price. In an engineering yard, where weight is an important unit, the rate fixing is frequently done on a tonnage basis as regards platers and erectors, and by measurement as regards planers at so much per foot. The rate as regards drillers and rivetters is fixed at so much per hundred holes and per hundred rivets respectively, while the smith's rates are usually fixed at so much per article, whether engaged on cleats, Lewis bolts, angle irons, or tool making, these rates being arrived at from data carefully gathered as to actual times taken by the men when working on time wages. The rates fixed should, of course, include all the time necessary for procuring tools, setting up machines, and obtaining material, and when once established should only be changed if the method of manufacture be changed. Overtime, night-shift, and other allowances should be paid to the men on the same conditions prevailing prior to the introduction of the system. In case of overtime the premium should be calculated on the actual time worked, without taking the extra time due to overtime into account. The workman, therefore, has every opportunity of adding to his earnings, and it is the writer's experience that, given the chance of honestly adding to his earnings, the workman will avail himself of the opportunity.

The wages question has always been one of the chief causes of friction between employer and employed, as witnessed from

time to time by the numerous strikes and lock-outs in the different branches of engineering; and this much can be said in favour of the Premium System, that it has been successfully introduced into large engineering works in this country in order to avert such undesirable methods of bringing about a reconciliation between capital and labour.

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